True Battlefield Visibility

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The whole art of war consists of getting at what lies on the other side of the hill, or in other words, what we do not know from what we do know.

—The Duke of Wellington, 1769-1852

THE U.S. MILITARY is changing, striving to integrate the promise of technology onto the battlefield. One change, enabled through digital communications and a proliferation of unmanned aerial vehicles (UAVs), is the reduction of the fog of war through vastly improved situational awareness. UAVs, from the U-2 to the RQ-4 Global Hawk to the hand-deployed Dragon Eye, will play key roles in future operations.

Within the Army's Objective Force-development effort, with its brigade-size Unit of Action, will be about 200 UAVs.[1] Control of these assets will be pushed down to the battalion level, but as the saying goes, "That which you do not control is not truly yours." The critical element of ground combat is not the combatant commander or the joint task force commander or the brigade or battalion commander; it is the company commander at the tip of the spear, where the vast array of technology options available to the commander dwindle to a few.

In combat, a company commander typically could not care less about the situation in the next brigade, much less across the continent. When engaged in high-tempo operations, he likely could not care less about the situation beyond the companies on his left or right. What really concerns him is the situation immediately in front of his position or what lies on the other side of the hill.

An infantry or armor company commander needing to know what confronts his force will gain that information from the digital common operating picture being fed from battalion, brigade, or higher. Yet, information from brigade and battalion might not be available because UAVs might be nonoperational, out of position, or grounded because of the weather; theater assets might be tasked against higher priorities; and national assets might be out of position. Should such be the case, there is an option.

Over the past two decades, the Army has developed sense-and-destroy armor munitions (SADARM), which are artillery or battlefield rocket-deployed weapons. In the 155-millimeter (mm) artillery variant, the SADARM round consists of two hockey-puck-shaped submunitions that are ejected as the round descends into the target area. Suspended below parachutes, the submunitions scan the ground below with a combination of infrared (IR) active and passive millimeter wave sensors.[2] Once sensors detect a target, preferably a tank or armored personnel carrier (APC), the submunition fires an explosive projectile into the top of the target.

The military has incorporated SADARM technology into a number of systems, including smart mortar rounds, which when coupled with global positioning system (GPS) receivers configured for use in guided artillery rounds, offers the promise of a family of organic reconnaissance assets readily available at battalion level and below. Such sensors require little technological development, merely what is typically referred to as "horizontal technology integration," which is the repackaging of existing technologies for nontraditional applications.

To detect what lies on the other side of the hill, or in an urban conflict, the next block, sensors can rapidly deploy and detect what lies ahead. A company commander who receives reports of suspected armor movements to his front and who knows UAV support is unavailable can call for artillery support. A single self-propelled artillery system could fire a single 155-mm SADARM variant, and then rapidly move to avoid counterbattery fire. The round would descend into the area, 300 meters in front of the company's position. Two submunitions could deploy, descending into the area while scanning the area below with visual and IR sensors. The imaging sensor, with an on-board GPS receiver and a low-power

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transmitter, would transmit the images of enemy tanks and APCs to a hardened laptop to provide the situational awareness the company commander needs. He could then request standard SADARM rounds, fired by the remainder of the artillery battery, followed a minute later by a second imaging round. The company commander could then view the burning remains of tanks and APCs.

In combat against a highly capable opponent, the artillery system is exposed to counterbattery fire when the system fires. The advantage of having corrected targeting data outweighs the risk. When facing a less-sophisticated enemy, as in Somalia, Afghanistan, and Iraq, soldiers can use an artillery-fired reconnaissance sensor in a wide range of applications. They can fire rounds to sanitize logistics routes, track movements, or verify equipment locations. The application of this sensor is almost endless.

At the company level, soldiers can incorporate the same technology into a mortar-fired round. Here the risk from unmasking a mortar tube would be a significant liability, although, assuming the imaging round detects targets, the mortar can immediately switch to conventional rounds. Again, imaging rounds offer the capability for correcting fires without actually observing the target area.

Modified SADARM-based imaging sensors offer tactical advantages at the lowest levels of command. As with any system, there are limitations and risks associated with the technology. Any commander, regardless of echelon, would like the ability to have his UAV above an area of interest and have it loiter there. Likewise, given a high enough threat and the unavailability of UAVs, that same commander would likely rather disclose the location of his artillery or mortar than remain in the dark.

When the SADARM entered production, the round had a production cost of $21,000.[3] When smart mortar rounds, such as the STRIX and MERLIN, entered production, they carried costs of $18,900 and $15,730, respectively.[4] Even allowing for a decade of inflation, modified imaging rounds will likely enter production at acceptable costs.

Today, billions of dollars are being spent in research to answer the question of what lies over the hill. A modified SADARM sensor has the potential to provide at least part of the answer, and that part is available at the level of command where it is most needed. ***MR***

NOTES

1. Ted McKenna, "Cleared for Action," *The Journal of Electronic Defense* (September 2003): 63.
2. U.S. Army Field Artillery School, "SADARM Success," *Field Artillery* (October 1994): 35.
3. Jane's Information Group, "DMS Market Intelligence Report," Ordnance and Munitions Forecast, August 1995, Generic Sense and Destroy Armor Submunition section.
4. Ibid., Merlin and Strix sections.

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